

That which is claimed is:

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1. A process for the production of products which are liquid at ambient conditions and contain organic sulfur compounds of higher molecular weight than corresponding sulfur-containing compounds in the feedstock, which process comprises:
  - 5 providing a feedstock comprising a mixture of hydrocarbons which includes olefins and sulfur-containing organic compounds, the feedstock consisting essentially of material boiling between about 60° C. and about 345° C. and having a sulfur content up to about 5,000 parts per million;
    - 10 in an initial contacting stage at elevated temperatures, contacting the feedstock with an acidic catalyst under conditions which are effective to convert a portion of the impurities to a sulfur-containing material of higher molecular weight through alkylation by the olefins, thereby forming an initial product stream; and
      - 15 in a subsequent contacting stage and at temperatures at least 10° C lower than an average of the elevated temperatures in the initial contacting stage, contacting at least a portion of the initial product stream with an acidic catalyst under conditions which are effective to convert a portion of the impurities to a sulfur-containing material of higher molecular weight through alkylation by the olefins, thereby forming a subsequent product stream.
  - 20 2. The process of claim 1 wherein the feedstock is comprised of a naphtha from a catalytic cracking process.
  3. The process of claim 1 wherein the feedstock is comprised of a naphtha from a thermal cracking process.
  - 25 4. The process of claim 1 wherein the feedstock is comprised of a treated naphtha which is prepared by removing basic nitrogen-containing impurities from a naphtha produced by a cracking process.
  5. The process of claim 1 wherein the olefin content of the feedstock is at least equal on a molar basis to that of the sulfur-containing organic compounds.
  6. The process of claim 1 wherein the elevated temperatures used in the initial contacting stage are in a range from about 100° C to about 235° C.
  - 30 7. The process of claim 1 wherein the acidic catalyst of initial contacting stage is different from that of the subsequent contacting stage.
  8. The process of claim 1 wherein the acidic catalyst in at least one of the contacting stages is a solid phosphoric acid catalyst, and wherein the feedstock is

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9. The process of claim 8 wherein the hydrating agent is at least one member of the group consisting of alkanols having from about 2 to about 5 carbon atoms.

10 ~~11.~~ A process for the production of products which are liquid at ambient conditions and have a reduced sulfur content relative to the feedstock, which process comprises:

up to about 5,000 parts per million;  
in an initial contacting stage at elevated temperatures, contacting the feedstock with an acidic catalyst under conditions which are effective to convert a portion of the impurities to a sulfur-containing material of higher boiling point through alkylation by the olefins, thereby forming an initial product stream;

in a subsequent contacting stage and at temperatures at least 10° C lower than an average of the elevated temperatures in the initial contacting stage, contacting at least a portion of the initial product stream with an acidic catalyst under conditions which are effective to convert a portion of the impurities to a sulfur-containing material of higher boiling point through alkylation by the olefins, thereby forming a subsequent product stream; and

fractionating the subsequent product stream by distillation to provide at least one low-boiling fraction consisting of a sulfur-lean fraction having a sulfur content less than about 50 parts per million, and a high-boiling fraction consisting of a sulfur-rich, fraction containing the balance of the sulfur.

30           12.    The process of claim 11 wherein the feedstock is comprised of a treated  
naphtha which is prepared by removing basic nitrogen-containing impurities from a  
naphtha produced by a cracking process.

13. The process of claim 11 wherein the olefin content of the feedstock is at least equal on a molar basis to that of the sulfur-containing organic compounds.

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14. The process of claim 11 wherein the elevated temperatures used in the initial contacting stage are in a range from about 100° C to about 235° C.

15. The process of claim 11 wherein the acidic catalyst in at least one of the contacting stages is a solid phosphoric acid catalyst, and wherein the feedstock is comprised of a hydrating agent in an amount which exhibits a capability to enhance performance of the catalyst.

16. The process of claim 11 wherein the elevated temperatures used in the initial contacting stage are in a range from about 110° C to about 220° C, and wherein the temperatures used in the subsequent contacting stage is at least 30° C lower than an average of the elevated temperatures in the initial contacting stage.

17. The process of claim 8 wherein the one low-boiling fraction has a distillation end point and the high-boiling fraction has an initial boiling point such that the distillation end point and the initial boiling point are in the range from about 80° C to about 220° C.

18. The process of claim 8 wherein the high-boiling fraction has a distillation end point which is below about 249° C.

19. A process for the production of products which are liquid at ambient conditions and have a reduced sulfur content relative to the feedstock, which process comprises:

20 providing a feedstock comprising a mixture of hydrocarbons which includes olefins and sulfur-containing organic compounds, the feedstock consisting essentially of material boiling between about 60° C. and about 345° C. and having a sulfur content up to about 5,000 parts per million;

25 in an initial contacting stage at elevated temperatures, contacting the feedstock with an acidic catalyst under conditions which are effective to convert a portion of the impurities to a sulfur-containing material of higher boiling point through alkylation by the olefins, thereby forming an initial product stream;

30 in a subsequent contacting stage and at temperatures at least 10° C lower than an average of the elevated temperatures in the initial contacting stage, contacting at least a portion of the initial product stream with an acidic catalyst under conditions which are effective to convert a portion of the impurities to a sulfur-containing material of higher boiling point through alkylation by the olefins, thereby forming a subsequent product stream;

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providing a feedstock comprising a mixture of hydrocarbons which includes olefins and sulfur-containing organic compounds, the feedstock consisting essentially

of material boiling between about 60° C. and about 345° C. and having a sulfur content up to about 5,000 parts per million;

- 5 in an initial contacting stage at elevated temperatures, contacting the feedstock with an acidic catalyst under conditions which are effective to convert a portion of the impurities to a sulfur-containing material of higher boiling point through alkylation by the olefins, thereby forming an initial product stream;

- 10 in a subsequent contacting stage and at temperatures at least 10° C lower than an average of the elevated temperatures in the initial contacting stage, contacting at least a portion of the initial product stream with an acidic catalyst under conditions which are effective to convert a portion of the impurities to a sulfur-containing material of higher boiling point through alkylation by the olefins, thereby forming a subsequent product stream; and

- 15 fractionating the subsequent product stream by distillation to provide at least one low-boiling fraction consisting of a sulfur-lean, fraction having a sulfur content less than about 50 parts per million, and a high-boiling fraction consisting of a sulfur-rich, fraction containing the balance of the sulfur.

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